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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/761,500

01/20/2004

Sang Woo Nam

SPO200512-0108US

4370

36872

7590

11/13/2007

THE LAW OFFICES OF ANDREW D. FORTNEY, PH.D., P.C.

401 W FALLBROOK AVE STE 204

FRESNO, CA 93711-5835

EXAMINER

BLAN, NICOLE R

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

11/13/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/761,500	<b>Applicant(s)</b> NAM ET AL.	
	<b>Examiner</b> Nicole Blan	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,4-12,14-18 and 26-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4-12, 14-18, and 26-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. The amendments made on August 31, 2007 are acknowledged.
2. The examiner withdraws the objection made to claim 18 in the office action dated May 31, 2007.

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1, 4-6, 8-12, 14-18, 26, and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramachandran et al. (U.S. PGPub 2003/0209514, hereafter '514), and further in view of Lapham et al. (U.S. Patent 4,885,106, hereafter '106).

Claims 1 and 12: '514 teaches a method for cleaning a semiconductor substrate [page 1, paragraph 6, lines 8-10] having and etched pattern of lines [page 1, paragraph 4] and is cleaned with an aqueous solution of sulfuric acid, hydrofluoric acid, and hydrogen peroxide [abstract; pages 2-3, paragraph 23] as well as supplying the cleaning solution to remove etch by-products

from the patterns of lines [page 3, paragraph 26]. It remains silent with respect to cooling the cleaning solution to a temperature lower than ambient temperature. However, '106 teaches cooling a solution comprising sulfuric acid and hydrogen peroxide preferably below 15°C to prevent the solution from being ineffective while in use [i.e. not having full cleaning capability] [col. 5, lines 40-68]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to cool the solution of '514 as disclosed in '106 because '106 teaches that cooling the solution will allow the cleaning solution to maintain effectiveness while in use.

Claims 4-6: '514 and '106 teach the limitations of claim 1 above. '106 teaches that the preferred temperature is below 15°C [col. 5, lines 40-52], which falls within the ranges of below 20°C, between 0°C and 20°C, and between 10°C and 20°C.

Claim 8: '514 and '106 teach the limitations of claim 1 above. '514 teaches that the etched pattern is formed from or in a semiconductor substrate [i.e. an integrated circuit is a semiconductor; page 1, paragraphs 3-4].

Claims 9-10 and 16-17: '514 and '106 teach the limitations of claims 1 and 12 above, respectively. '514 teaches that the etched pattern [page 1, paragraph 4] can be comprised of multiple layers [page 1, paragraph 7, lines 9-11] which reads on comprising a single layer of material as well as comprising multi-layers.

Claims 11 and 18: '514 and '106 teach the limitations of claims 1 and 12 above, respectively. '514 teaches that the etched pattern comprises a conductor made of aluminum [page 1, paragraphs 3-4].

Claims 26 and 14-15: '514 and '106 teach the limitations of claim 12 above. '106 teaches that the preferred temperature is below 15°C [col. 5, lines 40-52], which falls within the ranges of below 20°C; between 0°C and 20°C, and between 10°C and 20°C.

Claims 30-31: '514 and '106 teach the limitations of claim 1 above. '514 teaches that the etched pattern is formed from or in a conducting layer [i.e. a metal layer] [page 1, paragraphs 3-4].

Claims 32-33: '514 and '106 teach the limitations of claims 1 and 12 above, respectively. '514 teaches that the etched pattern comprises aluminum [page 1, paragraphs 3-4].

6. Claims 7 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over '514 and '106, and further in view of Ritzdorf et al. (U.S. PGPub 2003/0020928, hereafter '928).

Claims 7 and 27: '514 and '106 teach the limitations of claims 1 and 12 above, respectively. They do not teach that cleaning comprises rotating the semiconductor between 3 seconds and 5 minutes, while delivering the solution to the rotating substrate. However, '928 teaches cleaning [page 2, paragraph 13; page 6, paragraph 89] a patterned substrate with a mixture of acids and an oxidizing agent [page 10, paragraph 139] by rotating the substrate while delivering the cleaning solution to the rotating substrate [page 8, paragraph 118]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to rotate the substrate while delivering the cleaning solution as disclosed in '928 to be used in the method taught by '514 with a reasonable expectation of success because '928 teaches that it is a suitable method for cleaning the substrate.

They do not teach that that cleaning comprises rotating the semiconductor between 3 seconds and 5 minutes. It would have been obvious to one having ordinary skill in the art at the

time the invention was made to optimize the cleaning time because it will vary based on the size of the semiconductor as well as the thickness of the layers or size of the particles to remove, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 28-29: '514 and '106 teach the limitations of claim 1 above. They do not explicitly teach that etched patterns can be formed in dielectric or insulating layers. However, '928 teaches that patterning [page 1, paragraph 2] can be done on dielectric layers [page 1, paragraph 3-4] such as semiconductor oxides [i.e. silicon oxide]. It is commonly known in the art that a silicon oxide is often used in the manufacturing of semiconductors as well as the fact that it is used as an insulator. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use dielectric or insulating layers as taught by '928 as the layers for forming patterning on in '514 with a reasonable expectation of success because '928 teaches that it is commonly known to form patterns in these layers during semiconductor processing.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1, 4-12, 14-18, and 26-33 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole Blan whose telephone number is 571-270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

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system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NRB



MICHAEL B. CLEVELAND  
SUPERVISORY PATENT EXAMINER